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Cover Page Footnote

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Peer Assisted Study Sessions (PASS): Does Gender Matter?

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ABSTRACT

Peer-learning is an effective way to assist students to acquire study skills and content knowledge, especially in university courses that students find difficult, and it is an effective adjunct to improve student retention. In 2014, Murdoch University in Perth, Western Australia, commenced Peer Assisted Study Sessions (PASS) in two first-year undergraduate subjects: a mathematics (statistics) unit and a business unit. The key finding in this evaluation was that while female mathematics students improved their final marks in response to attending a greater number of sessions per semester, male students achieved lower final marks on average. Although several studies have shown that in PASS-like programs gender tends to not be a significant factor relating to achievement, our results suggest otherwise. In this article we posit the observed differences in achievement attributed to gender arise from complex gender-related issues, including gender stereotypes, student gender ratios in class, the gender of the teacher relative to the gender of the student, and gender-related motivation, engagement, and subject choice. An approach to remediate gender-associated differences in achievement for PASS attendees is proposed.

INTRODUCTION

Higher education in Australia has undergone rapid change, causing a substantial shift in the demographic of first-year university students. Presently, with the implementation of the Bradley Review of Higher Education (Bradley, Noon, Nugent, & Scales, 2008), the introduction of fee-help, uncapping of student numbers, and forces of globalisation, the first-year university student cohort has become more diverse, coming to university with a variety of skills, backgrounds, and prior education. A few decades ago, university students tended to be school-leavers who gained entry to university by scoring sufficiently high grades on their entry examinations to be offered one of the limited places in a university course (Jones, 2013; Norton, 2014). There has also been a marked increase in the proportion of female students entering Australian universities. According to the federal Education Department, between 2002 and 2012 there was a 33.5% increase in the number of females undertaking a university education compared to a 22% increase for males (Maslen, 2013).

Transition to university life can be difficult for students and many struggle when faced with mandatory first-year subjects that are heavy in content. Learning support provided by student peers has been shown to be an effective way to assist students to acquire study skills and adapt to university life (Topping, 2005). Through a collaborative and student-centred approach,

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Peer Assisted Study Sessions (PASS) use student Leaders who have previously completed the unit of study to facilitate and promote self-directed learning through small group interactions. This model of peer learning encourages communication, cooperation, independence, and responsibility, as both student and Leader engage with the course content and employ appropriate and useful study strategies (Arendale, 1994, 2014). There is an abundance of evidence collectively supporting the benefits of PASS, especially by increasing grades and pass rates and lowering withdrawal and failure rates (Dawson, van der Meer, Skalicky, & Cowley, 2014). PASS is similar to other peer learning programs that are known as Peer Assisted Learning (PAL) and Supplemental Instruction (SI). Reference to PASS in this paper should be taken to include other similar programs.

When McKenzie and Schweitzer (2001) attempted to uncover factors that contribute to students' grades and success at university, they found gender was not a contributing factor. Gender alone does not appear to be responsible for educational outcomes, but it is heavily implicated in several psychosocial philosophies within education. To this end, gender and gender-related issues have remained a centrepiece in the context of education for decades, especially with respect to student engagement and motivation, preferred learning style, subject choice, and interactions with teachers and peers. At university, the diversity and gender mix of the greater student population trickles down to more intimate settings like tutorials, workshops, and other small group work environments like PASS. Yet, the influence of gender, specifically in relation to peer facilitated learning programs like PASS, has not been fully explored.

Aim of the study

This paper arose from an evaluation following the inauguration of PASS in an Australian university. The results made us question whether proponents of peer learning duly consider how gender might affect learning within different subjects and in small, peer facilitated study sessions. This paper reviews some of the key issues surrounding gender, focussing on higher education, and presents data from our evaluation of PASS. The aim is to initiate discussion about the influence of student gender, PASS Leader gender, and the gender mix within peer learning sessions and suggest how students and staff involved in peer learning might meet the challenges that gender presents in this setting.

Gender and self-regulated learning, engagement, and motivation

Teachers in higher education assume that adult learners are motivated to self-regulate and direct their own learning. Much of the theory that underpins adult teaching and learning is grounded in the key assumptions of Eduard C. Lindeman's early work that proclaimed adults to be "…motivated to learn as they experience needs and interests that learning will satisfy" and they "…have a deep need to be self-directing" (Knowles, Swanson, & Holton, 2011, p. 39). Self-regulated learning has been defined and shaped by several theorists (Virtanen, Räikkönen, & Ikonen, 2015); however, a useful definition based on the key theories describes it as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment" (Pintrich, Wolters, & Baxter, 2000, p. 453). In education, there are well-

established links between motivation, engagement, and success (Dolezal, 2011; Kadhiravan, 2012). Interestingly, there has been very little in the way of conclusive evidence that gender alone influences self-directed learning, except in the case of mathematics and science. Nevertheless, female students have remained under-represented in traditionally male dominated subjects, despite there being an absence of conclusive evidence supporting male students achieving higher results than female students in these subjects. This does not appear to be the case with reading. A recent finding from a study of 65 countries by the Program for International Student Assessment (PISA) concluded that 15 year old females were more engaged and better readers than their male counterparts (Brozo et al., 2014). Wigfield, Eccles, and Pintrich (1996) propose that in certain subjects, stereotypic gender roles might influence students' self-belief in that subject as they conform to accepted gender-specific behaviours rather than showing genuine interest and engagement in the subject. In reviewing the relationship between motivation theory and gender, Meece, Glienke, and Burg (2006) also agreed that motivation-related beliefs of males and females follow gender stereotypes. The stereotypic gender roles in society also tend to flow through to the decision to seek higher education. Kimmel, Gaylor, and Hayes (2014) found women are likely to seek higher education to broaden opportunities and provide a role model for their children, more so than males. However, they reported females also feel more impeded by barriers to higher education, such as concern about paying off student loans, lack of childcare, and time away from their family; stereotypically these are viewed as female-domestic responsibilities. Therefore gender stereotypes and traditional gender roles play a fundamental role in shaping education, which influences motivation and engagement by students.

Gender and subject choice

The debate continues over gender-specific subject choice and the disproportion of gender in particular educational courses. Understandably, motivation to learn drives subject choice, but a complex mix of gender-related issues during development can be influential to subject choice later in life. In describing the under-representation of females studying physics in England, Stewart (1998, p. 286) declared that the "attitudes of pupils towards physics are coloured by the complex and inextricable interweaving of unavoidable biological differences, early socialization and school effects. The relative contributions of 'nature' and 'nurture' towards such attitudes are extremely difficult to determine." Colley and Comber (2003) looked at differences in subject preference between year 7 and year 11 students and reported stronger gender effects for older adolescents. They also identified mathematics as becoming "one of the most masculine subjects in Year 11." In an explanation of their findings, Colley and Comber (2003, p. 64) cited the gender intensification hypothesis (Archer, 1984; Hill & Lynch, 1982), which predicts males and females will adopt more rigid gender-related roles as they become older. Almost 20 years later in Singapore, Oon and Subramaniam (2015, p. 382) cited similar reasons as Stewart (1998) for subject choice. They found upper secondary and pre-university students enrolled in what they described as "gender-typical [subject] choice patterns," with males choosing Engineering and females choosing Arts and Social Sciences. There is, at the very least, a perception of stereotypical gender-roles and responsibilities in society and this re-emerging theme seems to influence a student's subject choice.

The student-Leader relationship

So far we have taken an atomistic view in an attempt to detangle relationships between gender and specific aspects of learning. In reality, the higher education teaching and learning space is a melange involving complex interactions between students and tutors/lecturers of different ages, cultures, worldviews, abilities, experiences, and behaviours, immersed in a gender blend embroiling all who are present. Dawson et al. (2014) also add that there are qualitative differences in the operationalisation of a PASS program that are not generally captured as data when programs are evaluated. These are likely to stem from personal and experiential differences that influence the "style" each PASS Leader adopts in their role as learning facilitator and the way they interact with students. We should not ignore the gender of the facilitator as it plays a role in how they might facilitate learning in PASS.

The interpersonal behaviour and student-Leader interactions associated with peer learning following several sessions and weeks together will be unique and complex. The effect that gender role stereotype has on motivation, engagement, and subject choice also draws into question the influence of gender in peer learning. Much of the success of peer assisted learning programs like PASS is attributed to the removal of the academic hierarchy by using more senior students as facilitators of learning instead of tutors, and the consistency of peer facilitation is addressed through accredited training (Dawson et al., 2014). However, the "roles and titles" of facilitators in an adult-learning setting are a matter of student perception; a student may not view a senior student differently to a tutor. In fact, at our university, many tutors are also students. Cheng and Walters (2009, p. 24) observe that even though responsibility is increasingly shared between students and facilitators during peer learning, "the facilitator is always an authority," suggesting that from time to time students might be reminded through student-Leader interactions that an order of authority *does* exist. Roorda (2012, as cited in Pennings et al., 2014) introduced interpersonal complementarity to explain teacher-student interactions in kindergarten; however, we see an application of this concept in higher levels of education and peer learning that may also be influenced by the gender mix of students within a group and the gender of the facilitator.

To explain how facilitator gender might influence peer learning, we provide a very brief overview of some key theory related to learning and behaviour. Pennings et al. (2014) explain that interpersonal complimentarity uses interpersonal theory to explain behavioural dimensions of i) agency where someone is dominant and ii) communion where a person "shows love, friendliness, and affiliation." It is the blend of agency and communion that underpins interpersonal theory and is central to "interpersonal complementarity" (p. 185). Furthermore, the relationships that develop within a group of people are intimately connected to time and to their experiences with each other. The processes involved in the relationships can be measured in real-time (seconds) or developmental time (these tend to be more stable characteristics of human behaviour) (Hollenstein, 2007; Pennings et al., 2014). The term "attractor" is used to describe a behavioural state that a particular system or group prefers and remains stable over a period of time (Granic & Hollenstein, 2003). To further explain the effect of an attractor in an educational setting, Pennings et al. (2014, p. 184) provide the following example: "[W]hen a teacher often compliments students [and] thus

encourages students to participate in classroom processes[,] this might imply that [the] teacher has a positive relationship with his or her students." In this way, the stability and variability of group behaviour influences teaching and learning. Not surprisingly, stability is important for a positive student-teacher relationship (Dishion, Nelson, Winter, & Bullock, 2004; Mainhard, Pennings, Wubbels, & Brekelmans, 2012). Given the influence of gender-role stereotypes on motivation, engagement, and subject choice reviewed earlier, it becomes increasingly difficult to eliminate gender as a factor influencing effective peer-facilitated learning.

Gender mix in particular subjects and student performance

If the perception of the student-PASS Leader relationship is akin to one between a student and teacher then the question about Leader gender becomes even more relevant. Several studies have identified that teacher gender can have an influence on a student's ability to perform well in particular subjects, especially those with mathematics content. Hoffmann and Oreopoulos (2009) assessed the effect of teacher gender in their study, which included 85% of students in a first-year college intake, and found that the overall grade for students studying subjects including Social Science, Mathematics, and Physical Sciences increased very slightly if they were taught by a teacher of the same gender. Artz and Welsch (2014) went a step further and investigated the effect of college teacher gender with respect to the gender mix in the classroom using a very large sample collected over four years in a United Arab Emirates university from the faculties of Arts and Sciences, Humanities, Social Sciences, Engineering, and Business. They also controlled for student self-selection into a class (based on the gender of the teacher), teacher heterogeneity, and student heterogeneity. Their study found that the gender of the teacher and students influenced students' results and that male and female teachers are more effective when teaching their own gender. Most significantly, their study implied that a female dominated classroom was a more effective and inclusive learning space for all students. Artz and Welsch (2014, p. 834) conclude that "students in a male dominated classroom depend heavily on the professor for learning. Whereas students in a female dominated classroom can study much more with each other and depend less on the professor for learning." A study by Griffith (2014) concurred, finding that female college students enrolled in Social Sciences, Humanities, or Natural Sciences achieve higher grades when taught by female teachers. Male students also increased their grades when taught by male teachers, regardless of the gender stereotype associated with the discipline, leading Griffith (2014) to speculate that grade improvement may be linked to the teacher simply being a same-gender role model to their students.

There have been some interesting studies oriented toward students' ability that implicate teacher gender, student gender, and classroom gender mix in mathematics and subjects that have mathematics-focussed content. Oosterbeek and Ewijk (2014) found that in subjects with high mathematics content, male students attained lower grades (as a measure of credit points) when the proportion of female students in their group increased. However, their study did not take into account the gender of the teacher. In both science and mathematics, Carrell, Page, and West (2009) found that female students perform better when taught by female teachers, whereas male students perform more poorly. Furthermore, in classes where both male and female students enter the course with a strong ability in mathematics, both

genders achieve equally high results, essentially closing the gender gap. By comparison, no such differences were observed in either English or History subjects. Cotner, Ballen, Brooks, and Moore (2011) asked whether female students in a science laboratory were more confident when taught by a female lecturer and female laboratory instructor using a number of different criteria. They reported that when either the lecturer or the laboratory instructor or both were female, female students made significant improvement to their confidence. However, when both lecturer and instructor were male, female students failed to gain confidence in science. On the other hand, male students did not improve overall when both lecturer and instructor were male but showed some patchy but significant improvement across isolated criteria. Therefore, for female students studying science, there was a much stronger endorsement for female lecturers and instructors compared to male lecturers and instructors. Takeda and Homberg (2014) used a self and peer-assessment of a large sample of business students collected over five years in a university in the United Kingdom and found a balance of gender in study groups produces higher results for all students. Most notably, lower performance in all-male study groups was observed in what was described as a "more troublesome group process" (Takeda & Homberg, 2014, p. 391).

PASS Leader gender and student gender

Although previous reports have found no association between gender and success rates for students attending PASS, we suggest that there may be more to learn about the influence of Leader gender, the gender mix of the students participating, and the subject being studied. In their review of SI, on which PASS is based, Dawson et al. (2014) reported the findings of two studies when attempting to establish the role of gender in these programs. One of these by MacMillan and Fayowski (2008) investigated whether PASS had different degrees of efficacy for male and female students in a calculus (mathematics) course. They found no interaction between gender and attendance at PASS having controlled for motivation. However, their study used students' prior grade point average (GPA) or an amalgamation of high school grades and/or institution grades as a proxy for motivation, thereby inferring motivation was influential on self-selection into PASS. The other study by Peterfreund, Rath, Xenos, and Bayliss (2008) examined all first level Science, Technology, Engineering, and Mathematics (STEM) subjects where SI was offered and showed that males who attended SI achieved higher grades than males who did not attend and that this margin was greater than the difference between females who did or did not attend SI. Students who chose to attend on average had a weaker pre-university GPA, but the authors presented these scores as average scores for attendees or non-attendees of SI. It would be more informative to calculate actual changes to each student's score and compare the average differences between those who attended SI and those who did not attend.

Past research and the current study

The literature suggests there are associations between student gender and subject choice, engagement, motivation, and success. However, there is limited information relating these issues to a peer learning environment like PASS. A local evaluation of PASS raised our curiosity about the role of gender in the program, and we submit there may yet be more to understand about the role of gender in peer facilitated learning. The following sections present

evidence from an evaluation of the PASS program at an Australian university. The results caused us to ponder how student grades of those who attended PASS could produce such gender-specific outcomes, to consider the significance of gender in peer learning, and to suggest some simple strategies to curtail gender-related trends.

METHODS

Units of Study

PASS was introduced into two first year units in 2014 at Murdoch University (MU), Perth, Western Australia, which has eight faculties referred to as Schools. The units chosen to implement PASS were a business unit in the School of Management and Governance and a mathematics unit in the School of Engineering and Information Technology. These units were selected because they are core first-year units in a number of courses, they historically record higher than average failure and withdrawal rates and both cover extensive discipline-specific content. Both units run for 12 teaching weeks and are offered in both semester one and two in the academic year.

PASS Leaders and sessions

The mathematics unit had five PASS Leaders; four female and one male Leader and offered eight one hour sessions per week in Semester 1 and seven sessions per week in Semester 2. The business unit had three PASS Leaders; two male Leaders and one female Leader and offered seven one hour sessions per week during Semester 1 and three sessions per week in Semester 2. All PASS Leaders had completed Leader training under the direction of the accredited supervisor.

Data collection

The number of students who attended PASS was recorded by the PASS Leader and collated by the accredited PASS Supervisor who categorised the students as having attended either 1–4, 5–9, or 10 or more sessions for the semester. In accordance with the MU Human Research Ethics Committee permit number 2014/042, these lists were forwarded to the MU Student Records Department who recovered the students' gender and final marks. The data were de-identified by the Records Department by removing the student number prior to returning the data to the PASS Supervisor. An additional list was generated which included the data for all students enrolled in the unit who did not attend any PASS sessions during the semester.

Data analysis

Associations between gender and regular attendance at PASS were determined by classifying regular attendance as attending five or more sessions per semester and calculating the Pearson's chi square ($\chi 2$) value from cross tabulation. Correlation between the number of sessions attended by students per semester and the average mark for each groups was determined using Spearman's rho (ρ). The difference in the average mark between groups of students was categorised according to the number of sessions attended per semester, and the interaction between genders was determined by analysis of variance (ANOVA). Description and analyses were completed using Statistical Package for the Social Sciences (SPSS) Version 21. The significance level was set to $\alpha < 0.05$.

RESULTS

There was no significant association between gender and regular attendance at PASS for students studying mathematics ($\chi^2 = 0.007$, $p = 0.934$) or business ($\chi^2 = 0.323$, $p = 0.570$). Approximately 37% of mathematics students who regularly attended PASS were male. Of those students who did not regularly attend PASS, approximately 37% were also male. In business studies, regular attendance was approximately equal for both genders. In business, 49.6% of PASS attendees were male and the proportion of males who attended less than five sessions or more than five sessions was statistically similar, 50.2% and 44.4%, respectively (Table 1).

Mathematics students who attended PASS did not improve their average mark for the subject regardless of the number of sessions they attended during the semester ($\rho = 0.009$, $p = 0.839$). The average mark for students who did not attend any sessions or attended 10 or more sessions was 54%. However for business students, there was a very weak but significant correlation between average mark and the number of sessions attended per semester ($\rho = 0.158$, $p < 0.01$), with average marks increasing from 52.2% for students who did not attend PASS to 61% for those who attended 10 or more sessions per semester (Table 2).

Table 1
Number of mathematics and business students who regularly attended PASS according to gender

	Attendance at PASS per semester	
Mathematics	**Less than 5 (%)**	**5 or more (%)**
Male	184 (37.4)	21 (36.8)
Female	308 (62.6)	36 (63.2)
Total	492 (100.0)	57 (100.0)
Business		
Male	124 (50.2)	12 (44.4)
Female	123 (49.8)	15 (55.6)
Total	247 (100.0)	27 (100.0)

An analysis of the average mark for students who attended PASS revealed that gender may be a contributing factor. For mathematics students, a two (gender) by four (attendance at PASS) analysis of variance revealed that there was no significant difference between average marks for students who attended a different number of sessions, $F(3, 541) = 0.17$, $p = 0.916$. However, the average marks of female students tended to increase with higher PASS-attendance, whereas male students with higher PASS attendance tended to achieve lower marks on average, and this interaction was approaching significance, $F(3, 541) = 2.563$, $p = 0.054$, $\eta_p^2 = 0.014$ (Figure 1a). A similar analysis of business students revealed that overall there was a significant difference in average marks between groups of students who attended a different number of sessions per semester, $F(3, 260) = 2.80$, $p = 0.041$. However, there was no significant interaction between the two genders, $F(3, 260) = 1.19$, $p = 0.31$ (Figure 1b).

Table 2
Average marks for mathematics and business students categorised according to the number of sessions attended per semester

	Sessions attended per semester				
Mathematics	**0**	**1-4**	**5-9**	**10+**	**TOTAL**
Students (n)	430	62	38	19	549
Male (n)	162	22	14	7	205
Female (n)	268	40	24	12	344
Mean mark (+/- SD)	53.9(23.9)	54.3(23.8)	54.0(22.4)	54.4(27.2)	54.0(23.8)
Business					
Students (n)	202	45	18	9	274
Male (n)	105	19	7	5	136
Female (n)	97	26	11	4	138
Mean mark (+/- SD)	52.2(18.4)	59.7(14.4)	59.5(18.0)	61.0(23.0)	54.2(18.1)
TOTAL	**632**	**107**	**56**	**28**	**823**

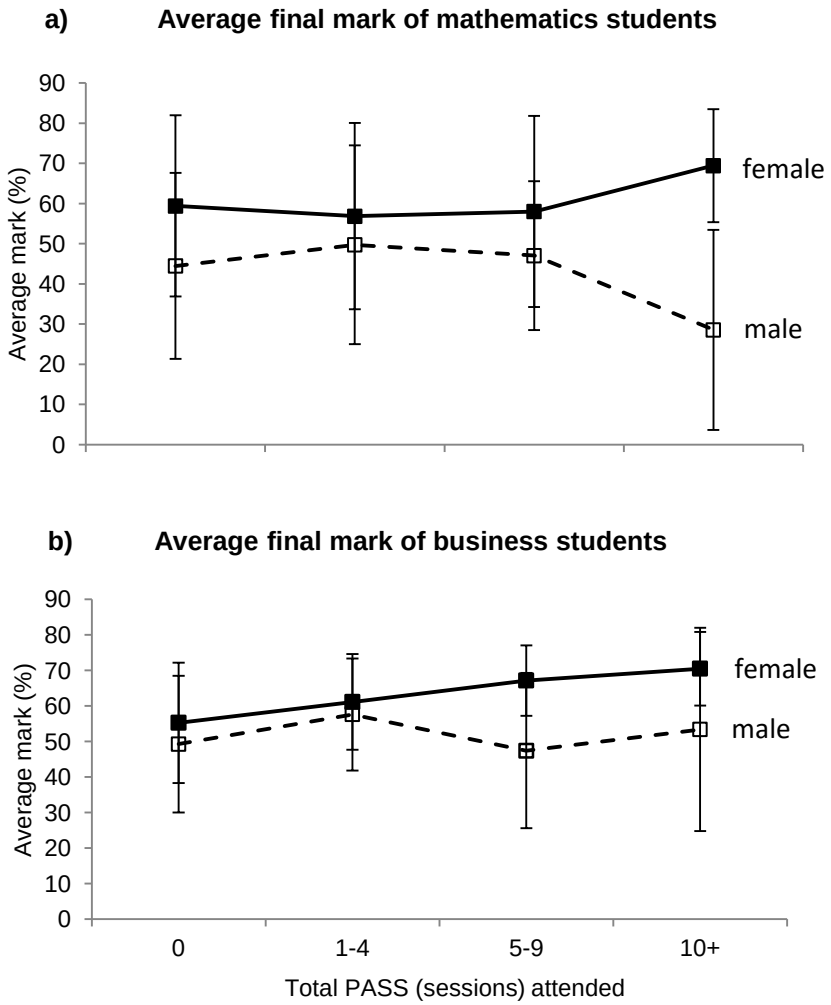

Figure 1. Average marks of females (solid line) and males (broken line) who attended PASS for a) mathematics and b) business subjects. Female students tended to achieve higher average marks if they attended more PASS sessions per semester, whereas males generally achieved lower marks (mean +/- SD).

DISCUSSION

Voluntary programs like PASS should aim to improve academic outcomes for all students. However, our evaluation of PASS at Murdoch University revealed that attending more PASS sessions may have gender-specific benefits. We posit that the observed differences in student grades between male and female students, particularly in mathematics, are not simply related to the gender of students per se, but are a product of the gender-related issues reviewed earlier. In essence, the differences between genders may be an artefact of PASS Leader gender and the student gender mix of participants and should be investigated further. However, it is worth considering approaches to counteracting gender-related effects in peer learning. The only players involved in a peer learning session are the attending students and the PASS Leader, so we propose looking at what the participating student might be able to do and also how the Leader might be able to remediate these influences.

The student's choice

Earlier, we reviewed how gender stereotypes influence student motivation, engagement, and success relative to the subject. In PASS, students voluntarily choose to participate in the program; however, it is our experience that students are unaware of the gender of their PASS Leader until they arrive at their first meeting. One approach that might improve the outcome for both genders, but remains untested, is to allow the participating students to choose which sessions to attend having been introduced to the Leaders who will facilitate the learning in each session. We propose that students might respond more positively in a peer learning environment when permitted to choose their Leader. In doing so, PASS participants are likely to make their decision having considered the subject of study, gender stereotype, and previous experience, which may promote effective peer learning.

Professional development and awareness training for Leaders

There is an opportunity for PASS supervisors to provide professional development and awareness training to Leaders on matters raised in this paper. PASS is an accredited program based on the model of SI originating at the University of Missouri-Kansas City in 1973 (Arendale, 1994). Globally, there are regions supported by at least one National Centre, including the United States of America, Canada, the United Kingdom, Europe, South Africa, and Australasia (Crisp & Cruz, 2009). Consequently, it is paramount that there is an international dissemination of standardised and appropriate information. Lufkin (2009) proposed some simple tips to help teachers reach everyone in the classroom regardless of race, ethnicity, or gender. Her article focusses primarily on shifting the inequity for women, so we have removed references from either gender's perspective to reflect gender neutrality. Table 3 contains a summary of her suggestions, reproduced with permission, and we suggest in the future this information could be incorporated into the Leader training package.

Building on this, Morrell and Parker (2013) proposed a cycle of behaviour perpetuated by educators that can have detrimental effects on learning. With a particular focus on inequity across STEM subjects, their "Culture Wheel" illustrates how unintentional negative micromessages arising from a teacher's own subconscious biases might have a negative effect on student success in a subject or even in their career. Alternatively, microaffirmations may work to

"counteract microinequalities" and contribute to better learning outcomes (Rowe, as cited in Morrell & Parker, 2013). This information should be incorporated into PASS training to further encourage PASS Leaders to reflect on their own practice and to inform supervisors' and Leaders' how subtle remarks and gestures borne from a worldview can have either a positive or negative influence on peer learning.

Table 3
Summary of approaches to encourage student inclusion in the classroom regardless of gender, race, and ethnicity that could be incorporated into PASS Leader training

1. Examine your teaching behaviour	Reflective practice is recognised as an essential element for teachers, including those in higher education (Campbell & Norton, 2007), and this could include PASS Leaders. This would encourage PASS Leaders to examine more closely how they manage social interactions within their session.
2. Use praise as a deliberate strategy	Practise good answers for all students, regardless of gender.
3. Give criticism in the form of a question	Rather than correcting incorrect responses, respond with a question. Leader training currently addresses the skilful deflection of questions directed at the Leader, and this tip further encourages positive interactions between Leaders and students.
4. Don't always call on the first hand that goes up	If this is done, it tends to encourage dominance over other students and may then become a dominance by one gender.
5. "Coach" females as well as males, and vice versa	This is particularly relevant in subjects where there are male or female gender stereotypes.
6. When you ask the class a question, look at all students	This is something that should always be done, but again, becomes more important in subjects with gender stereotypes.
7. Listen attentively to all students when they speak	Leaders should model good interpersonal communication by relaying visual cues and gestures and by maintaining eye contact.
8. Intervene when male students show disrespect for female students, and vice versa	These can occur as direct comments or through gesture, and it is the responsibility of the Leader to disallow such behaviour.
9. Do not allow students to interrupt each other	Sometimes male students will tend to interrupt female students. Leaders should not allow either gender to interrupt, and as part of their own reflection, they should examine their own practice to ensure there is no gender bias.
10. Use small groups to foster cooperative, rather than competitive learning	Leaders need to clearly explain to their students that everyone should encourage others to participate and respect each other's contribution to avoid perpetuating or replicating gender stereotype behaviour.

11. Avoid stories and jokes that denigrate either gender	This includes general statements relating to gender, including positive statements like "women tend to be more organised than men."
12. In giving credit to students' contributions, be sure to give it to males as much as females and to the right person	Make sure that the praise for any contribution is given to the right person. Sometimes a comment initiated by a student from one gender is finished by a student from another gender, so the first person's contribution should not be ignored.
13. Judge females' and males' contributions to the class by the content of their ideas rather than by the style of their speech	Do not assume females or males who hesitate or preface their contribution with statements like, " I am not sure if this is right, but….." are less intelligent or ignorant.
14. Use parallel terminology in describing both genders	For example, choose to use equitable terms to describe each gender, such as "men and women," not "men and girls."
15. Do not group students by gender	This tends to create competition between genders and implies that one gender is more qualified than the other.
16. Do not make seemingly helpful remarks that disparage females' or males' abilities	The example from Lufkin is saying something like, "I know that a lot of females have trouble with math, so I'll be happy to help anyone who needs extra help."
17. Ask males and females the same kinds of questions	Make sure the questions are equally challenging or difficult when asking them to students of either gender, not easier questions for one gender, which suggests that gender cannot answer more difficult questions.
18. Call male and female students by name	Sometimes teachers have found they know more names of students in one gender, so Leaders should make an effort to learn the names of all their students.

FINAL COMMENTS

There is substantial evidence of gender-specific benefits for students studying particular subjects, especially those with mathematics content, arising from gender-related social interactions in the classroom. Our evaluation of PASS also illustrates this trend. The difference in grades between genders for students who attended more PASS may be a symptom of gender role stereotypes, subject choice, and the complex interpersonal relationships within the study group evolving from the gender mix within the group. The relationship between students and their Leader is important if PASS is to function as a strategy to assist students in their learning. Currently, the influence of gender on the peer-Leader relationship tends to escape attention during evaluations of peer learning programs.

Limitations of the study

The authors hope these preliminary findings reveal to the peer learning community how issues relating to gender may be influential to learning, but acknowledge there are limitations to this study. We have not controlled for potentially influential covariates such as ethnicity and student background or provided evidence of prior success linked to motivation. However, we observed that the proportion of each gender that self-selected and regularly attended PASS was approximately the same for both mathematics and business subjects. While the sample represents students enrolled in both

units over two semesters (one academic year), the sample size of pass attendees relative to total students enrolled is small, and the variance in final mark is different between genders, especially for students who attended 10 or more sessions. Furthermore, the evaluation of academic success associated with PASS attendance has been determined from final marks; therefore PASS-related effects during a semester remain unknown in this study. Despite these limitations, this study provides a springboard and invitation for further discussion on the influence of gender in the context of peer learning.

Recommendations for future studies

This study raises several questions that could direct future research in this area. Subsequent research questions might include asking how the proportion of one gender in PASS, and the PASS Leader's gender, influence the academic results of PASS attendees within particular subjects like STEM. It would also be useful to understand gender-related issues from the students' perspective by asking PASS attendees and Leaders how they believe gender influences peer learning using a qualitative research method.

Although the PASS model of learning aims to reduce the power differential between Leader and student to make it differ from the teacher-student relationship, this may largely remain a question of student perception. Their perception is likely to shape student-student, and student-Leader interactions during PASS, but also evolve over repeated sessions together during a semester. The gender mix within a small group may influence interpersonal behaviour that in turn determines how effective PASS becomes as a learning strategy for students of both genders. It would also be interesting to investigate how the age of the Leader relative to the students' average age affects these interactions. In addition, standardising the facilitation methods and materials between PASS Leaders to control these variables may help us to obtain a clearer picture of how gender influences these dynamic interactions within PASS sessions.

We hope the points raised in this paper encourage a new perspective on how PASS is evaluated and how we train and inform our community of practitioners. Importantly, we anticipate the issues emanating from gender and their influence on interpersonal relationships emphasised in the context of peer learning will lead to further insightful discussions.

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